Portfolio Showcase

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Key takeaways

Anew

Smartphone Operating System Design

Performance

49% reduction in daily anxiety

for users of our smartphone OS

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Uber ATG

Mapping Application Design

Performance

27% increased output

and company savings of $72,000/month

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Anew

Smartphone Operating System Design

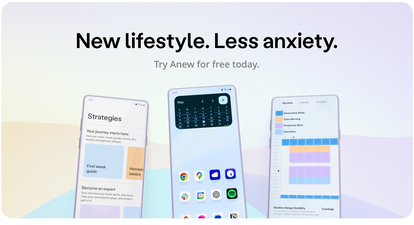
Product goal

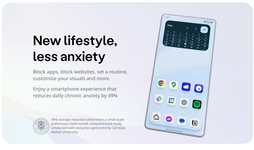
Enable self-treatment for phone overuse and mental health, at scale.

Performance

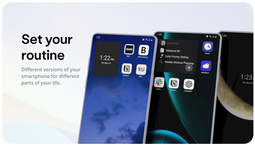
49% reduction in daily anxiety

on average compared to participant initial baseline, after 30 days of use.

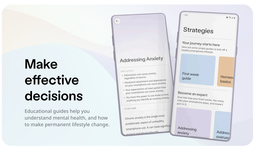




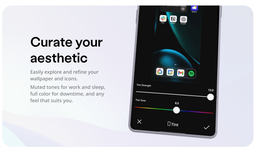
Extensive and customizable app and website blocking allowed users to target apps and websites that disrupted their desired behavioral patterns. **Blocking reduces dependence, reducing anxiety.**



Users' behavioral needs change based on what part of their daily routine they're engaged in. Apps that steal attention during work, for example, are not problematic for them in the evening. **Less self-policing helps to reduce anxiety.**



Goal setting and education in regards to goal setting, habits, behavior, and mental health are all areas that require a primer in order to best enable the user to make effective decisions. **Accurate decisions to their own needs result in lower phone dependence for the user, and lower anxiety as a result.**



Control over the visual representation of the phone allows users to decide how competitive it is for their attention. **If it is less engaging, their habits change over time, which reduces dependence and ultimately anxiety.**

Design process

Pilot Prototype and Study

Problem statement

What aspects of PSU (Problematic Smartphone Use) can we treat through educational and environmental intervention, and how well?

PSU is generally defined as phone influence on anxiety, depression, memory, focus, and sleep.

Strategy

- Design and develop an MVP prototype OS based on initial research and treatment assumptions.
- Create a guided process for users to learn about behavioral health, and decide on personal lifestyle goals.
- Plan and conduct a comprehensive study, with participants using the guided process and prototype OS for a month each.
- Measure impact with standardized medical assessment of anxiety and depression, in addition to intermittent questionnaires, interviews, and journaling over the study.

Background research

Informal interviews

To establish case for research, I conducted over 50 informal discussions with phone users, across age and lifestyle demographics.

The result, was **nearly all of them had a specific story** in which their phone use disrupted their desired lifestyle.

Study application survey

Applications were sourced from the Carnegie Mellon community, with a survey about their phone use and mental health.

60 applications were received in a week, with **over half indicating moderate to severe mental health concern** looking for intervention in regards to their phone use.

Macro trends

With a focus on mental health issues associated with phone use, such as anxiety and depression, I looked into macro mental health trends influenced by these issues in the National Institutes of Health (NIH) data and research.

A number of trends began at the advent of significant national smartphone adoption, which strengthened the case that phone use was a potential factor.

Study process

Assess participant initial state

Before beginning, participants fill out several self-screening mental health assessments. This establishes our baseline state.

Notably, GAD-7 anxiety screenings indicated participants had **relatively high baseline anxiety**.

GAD-7, BDI-II, and others

Mental health self-assessments

Guided education and goal setting

Participants went through a guided education and decision making process, allowing them to understand how to effectively set goals and make decisions towards them regarding their phone's influence on lifestyle.

Participants had consistent feedback that **this was significantly impactful in achieving their results**.

+ 12 guided sections

Set up personalized system

Participants used our MVP tools on desktop to gradually setup their personalized OS, based on their goal setting. The changes are reflected on their MVP OS.

Decisions here were framed directly from the guided education they completed earlier in the process.

Monitored use for 30 days

Participants used their custom OS as their daily smartphone, while completing intermittent psych & UX questionnaires, interviews, and journaling.

This expansive feedback process produced hours of interviews, and hundreds of pages of notes and questionnaire answers. This **painted a picture of what was effective**, why, and how behavioral changes manifested in each case.

Final assessment

Participants completed the same self-screening mental health assessments that began the study, along with comprehensive exit interviews and questionnaires.

Some metrics like depression didn't change, however **anxiety notably dropped on average by 49% across participants**.

Findings

- Average **49% decrease in daily anxiety**.
- Significant findings on aspects of design strategy that **enabled effective user decision making**.
- Clear picture of what prototype **features resulted in net impact**, and what should be adapted or eliminated from design strategy.
- Improved understanding of treatment philosophy, with **actionable areas of product improvement**.

Takeaway

Based on the study results, it was clear that while achieving individual results was not simple, it was achievable. And achievable in a relatively short period.

The combination of education and targeted tooling was strategically effective in treating unwanted behavioral patterns, which ultimately resulted in mental health issues over time.

Participant feedback

Before use

"It [phone] also **undercuts my focus and my spare time**, which I'd like to be a lot better than it currently is."

"At times, it **doesn't feel like [I have] much [control]**, mostly due to a feeling of being shoehorned into my decisions as a result of a lack of guaranteed flexible time."

"I'm hoping to break or at least **reduce some of my bad habits** regarding my phone. Compulsive checking, unnecessary usage before sleeping..."

After use

"**I never set goals like this before**, it was really helpful."

"I've gained a **better understanding** of common bad phone habits, and in particular, my bad phone habits, as well as ways to address those habits"

"The first two weeks of the study, I think the time my screen time **went down by the magnitude of hours**, which is a little worrying. Yeah just like somewhere in the range of like **6-7 hours.**"

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Commercialization

Problem statement

How to produce a product, leveraging study findings, that:

- Is easily **accessible to the market**.
- Has improved **treatment efficacy**.
- Is self-service and **self-explanatory**.
- Has **improved ease of use**.

Strategy

- Design and implement baseline mechanics available in this product category.
- Design, test, and implement features that lead to users' desired outcomes.
- Design and test refined content for our educational strategy, paired strategically with the product feature set.

Homescreen core mechanics

Here, I leveraged existing and expected interaction mechanics from a product in this mature space.

This feature set was not allocated significant usability testing, as:

- It aimed for usability parity with other product leaders.
- The pilot study MVP tested and validated some assumptions in regard to curation's impact on user agency and effects on dependence and anxiety.

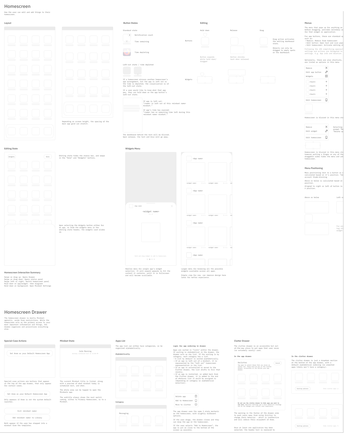
Homescreen development fell within the scope of the product, as having product control of the homescreen interface allowed us critical advantages in:

- Controlling visual treatment of apps and functionality.
- Changing visual appearance and configuration of apps based on user routines.
- Omitting applications that were blocked, instead of simply blocking their access upon launch.

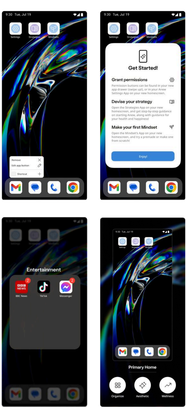
In the pilot study, user anxiety treatment was significantly influenced by the user's ability to curate their visual environment, by **leveraging our design principles of environmental design to influence the user's behavior and mental model.**

Samples

Low fidelity interaction and system design



High fidelity treatments



Mindsets feature set

A "Mindset" in the context of Anew, is **a different version of your phone**. A Mindset can have different homescreen arrangements, different backgrounds and visual app treatments, different apps and websites blocked, and can be set on a scheduled routine.

The Mindsets "app" is a built-in feature set that allows for the creation and management of phone versions, schedules, and change flexibility.

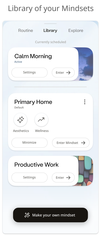
In the pilot study, participants created 4 Mindsets in the MVP product, which allowed them to capture their daily routines. **This routine-based approach was central to their goal setting, and in achieving their reduced anxiety.**

Many users decide to block apps in other app-blocking products, but misalign their decisions to their desired schedule, resulting in failure. By framing decision making around specific aspects of the user lifestyle, we can **ensure their decisions align with their specific goals for that aspect of their lifestyle.**

Current iteration samples

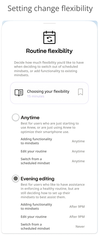
High fidelity treatments

Library of your Mindsets

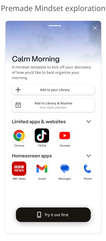


Your weekly Mindset routines

Setting change flexibility



Premade Mindset exploration



Low fidelity interaction and system design

Aesthetics feature set

This "environmental design" feature set allowed users to curate their homescreen visual representation relatively granularly.

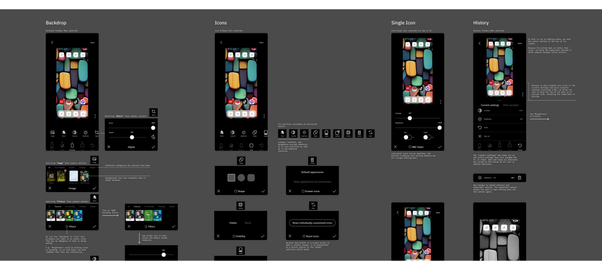
In the pilot study, we found that by allowing curation of visual representation, **users enjoyed being able to control how attractive the interfaces felt.** This allowed them to control the homescreen and apps influence on directing their attention.

Many users in the pilot study set up their MVP system with greyscale icons, with very little color. This **allowed them to break their associations with apps, and change their reflexive behaviors to overuse.**

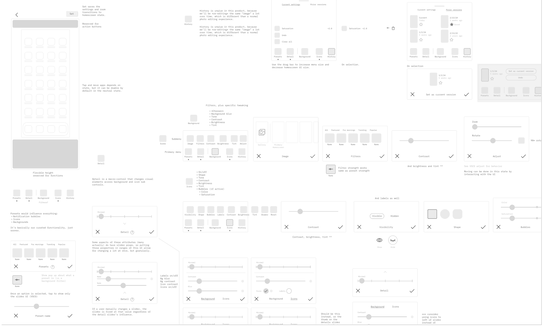
This current iteration was influenced by **widely used photo editing UI standards**, which we established by conducting a case study of 6 industry leaders. With those patterns familiar to our audience, we created a variant UI enabling our treatment feature set.

Current iteration samples

High fidelity treatments



Low fidelity interaction and system design



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Education feature set

Our treatment approach combines education and features. Without an idea of how to make decisions, it's harder to reach desired outcomes.

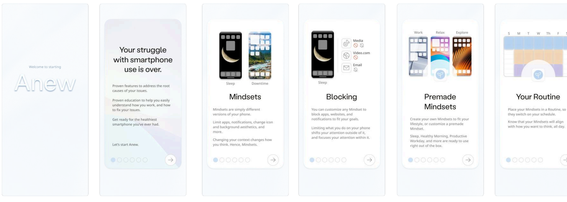
Onboarding, and a designated Strategies "app" within the product enable discovery and self-directed education.

The Strategies app leverages the **same goal setting and treatment approach used in the pilot study**, which we found effective in treating anxiety.

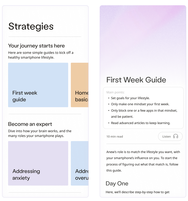
It provides guided goal setting, along with supplements outlining how **environmental design within the phone can be leveraged to direct attention and change behavior strategically, resulting in lower dependence and anxiety.**

Current iteration samples

Onboarding



Strategies App



Wellness feature set

The Wellness system within Anew utilizes the user's usage data to understand their behavioral patterns that they may be unaware of. **It takes their relatively complex data, and presents it in a simple to understand, and actionable format.**

The Wellness analytical model is not outlined here, but simply put we take an array of time-based datapoints of app usage, notifications, and interaction patterns, and use that to **estimate the risk that the phone is having an adverse effect on their daily anxiety, and how much**.

The **pilot study MVP OS did not provide user feedback** in regards to their health and effectiveness of the product. While users did self report that their anxiety was reduced and they felt positive change in their mental health and behavior, there wasn't great clarity for them as to what specific changes had impact.

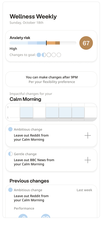
Analytics and recommendations provided an attractive opportunity to allow us to understand what Mindsets and settings had what impact. Further, we could provide that information and our recommendations to them to allow them to **improve their ability to understand their use, and target factors that caused undesired behavioral influence over time**.

Because this feature set was not part of the pilot study, it was **researched and designed in collaboration with an OCD therapist advisor** in addition to users and other advisors.

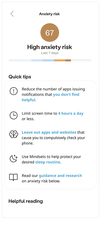
Iteration samples

High fidelity treatments Iteration 3

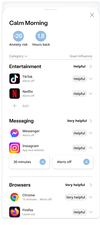
Wellness overview



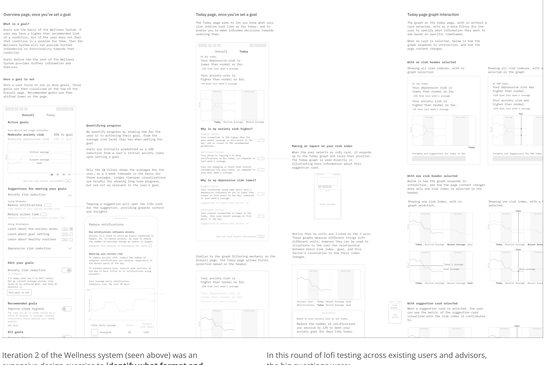
Anxiety risk details page



A Mindset's Wellness settings
Blocking and limiting access



Low fidelity interaction and system design Iteration 2



Iteration 2 of the Wellness system (seen above) was an expansive design exercise to **identify what format and presentation of data was most useful and easy to understand**.

A key finding, was that **too high a granularity in data made users anxious and self conscious about their use.** This design and research phase set the foundation of our functional strategy, while giving clear guidance to changes for iteration 3 (seen above in high fidelity examples).

In this round of lofi testing across existing users and advisors, the big questions were:

- What data is most valuable to a user in making decisions about their system?
- How should that data be presented to be digestible and actionable?
- What features and education should be presented in collaboration with visualization, to enable user next decisions easily?

Research Strategies

Public beta releases

Public testing of the app was pushed and monitored to get ongoing quantitative feedback via analytics, and ongoing qualitative feedback via email from users.

"State Of Anew" design drafts for advisors

To keep advisors and invested users up to date, I released several 10-20 page documents outlining design direction and changes to solicit feedback and discussion.

Interviews and critiques

User interviews and lengthy critiques from fellow designers in the industry helped to challenge and refine Anew at every phase.

Governing Management, Production, & Strategic Philosophy

Limited resources and pragmatism

Anew was bootstrapped completely, following a macro-tightening of VC. The space is also largely under researched, requiring significant R&D.

Many aspects of a solution in this space have inherent irreducible complexity. Based on the nature of research questions we faced, instead of smaller tests, I structured larger research and design phases to test a large amount of strategic assumptions each go. This increased each testing round's risk profile, but allowed testing more with less overall resources.

Structured production phases

As the single lead developer and lead designer, I structured separate development and design cycles to allow focus on the complexities of each role.

Many considerations the roles make can be contradictory, so keeping rationale separate was important to maintain focused delivery.

Balanced monetary and ethical goals

At each production landmark, strategic viability was reassessed based on resources and findings.

At each point leading to completion of public release, the feedback and willingness-to-pay from the market gave significant enough indications that continuation was viable.

In addition, the opportunity to create significant social good catalyzed effort exceeding what was often realistic, which allowed for expedited progress compared to a corporate setting.

Fill gaps with talent and advisors

Bootstrapping meant I couldn't pay salaries or compensation to compensate for professional value.

To utilize talent, I hosted internships focused on professional value creation to translate to their next opportunity.

For both talent and advisors, I utilized storytelling with a focus on social good and related to their own aspirations for change.

Prioritization within design and research

Research questions pertaining to treatment and usability were prioritized.

Design execution was prioritized towards system design, with high fidelity being secondary with "passable" being the goal. Strategically, we wanted to make sure the core experience was aimed correctly at resolving market needs before overanalyzing polish. As such, the high fidelity state leaves room for most improvement across the rest of delivered design.

Appreciating problem scope

This is, definitively, one of the most important and difficult design problems that exist today.

The smartphone's influences within the larger systems of any person's life, are very specific and very complex.

As such, addressing a problem at this scale, with this scope, with limited resources, presents significant challenge. Appreciating that unique degree of challenge is important in a space like this. Designing a shopping app, or single tool UI, is a much simpler scope that traditional designers are more familiar with.

Understanding this is important to appropriately assign and mentor contributors within subsets of that scope.

Uber ATG

Mapping Application Design

Product goal

Enable faster map data annotation,
maintaining accuracy, and faster onboarding.

Performance

27% increased output

on average compared to employee performance using previously designed mapping tools.

Business impact

$72,000 saved each month

given the team size of 40 users, which was set to scale with a strategic expansion of mapping operator users in the US and India.

Path conflict annotation

70% faster

Speed limit annotation

60% faster

Street sign annotation

22% faster

Driving path annotation

11% faster

Context and considerations

Map Maker application

I was brought on as the sole designer and design lead of the Map Maker application.

Autonomous cars would collect data and map the cities Uber planned to operate in, but that raw data was not usable alone.

The role of the Map Maker application was to **enable large teams of specialized mapping employees to annotate a large variety of different types of spacial and visual data inputs on a map.** Then, the autonomous cars would use that annotated data to navigate live in operation.

Specialized user base

Mappers used the Map Maker application 8 hours a day, 5 days a week. Because of this focus, **we could utilize design patterns that required short onboarding, but had high gains in performance after adoption.**

This is in contrast to consumer apps, which are used less often by users, and don't allow or merit such performance optimizations.

Fluid requirements and customer needs

The autonomous-car space requires multiple specialized teams working on specific and complex problems. From geographic localization, to vision, to prediction - each team (brimming with PhDs) has specific data needs for their systems to function.

Much of the data these teams need is created and refined in my team's application, "Map Maker". **As each team figures out how to build and improve their strategies, their data needs change.**

This meant that my application and system design had to allow for both specific tooling for different types of data, but also have flexibility in user mechanics to accommodate for fluid data and tool requirements.

NDA restrictions

I can't disclose full application design specs publicly given NDA. However I can describe strategy, impact, and general UI mechanics.

Path conflict annotation

70% faster

Conflicts are incredibly important, as they are the mapping annotation that determines what cars have the right of way when driving path annotations cross. That's every intersection. This entails a significant amount of the mapper's workload.

Previously, conflicts were annotated in menus, and **were difficult to navigate and annotate.**

I designed a completely different visualization and workflow system for conflict annotation, utilizing the visual map and a shortcut schema I introduced, instead of menus.

I created the concept of a visualization "Lens" for each conflict, allowing users to **easily see their current workload, visualize state, and annotate it quickly**, with no additional menus.

Lenses

Visual Treatment

Zoom levels

Reusable geometry

A huge initial problem I noticed in the previous mapping system design, was the **amount of repeated work required of users**.

Before my involvement, all geographic drawing of geometry on maps - drawing driving paths, drawing road edges, drawing driveways, etc - was **all done with separate, overlapping lines on the map**.

This work had to be precise to be used in autonomy, so repeating such precise mapping significantly slowed map production.

To address this, I introduce design that allowed annotation of existing map geometry - dubbed "Portions".

Instead of redrawing all new map features, **existing map features could now be annotated in 2 clicks**. Speed limits require the greatest volume of repeated annotation, so this annotation efficiency benefited significantly.

Driving path drawing efficiency and others were also **improved by the drawing mechanics introduced with this feature**.

Speed limit annotation

60% faster

Driving path annotation

11% faster

Draw

Draw portion on existing feature

Selection

Overall efficiency

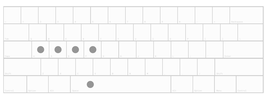
27% faster

Optimizing the overall tooling workflow for users was another primary goal I identified in user observation and interviews. Once implemented, **this improvement influenced the total efficiency of all mapping tasks**.

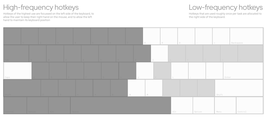
Previously, significant time was wasted switching tools and traversing the UI manually, given huge required screen sizes for mappers to work. Users had some hotkeys, but they did not encompass all tools and functions they needed, which made them unreliable from the view of the mapping team.

Prior to my involvement, users had a long list of tools to use on the side of the application UI. As the number of tools and features expanded, I created a categorization schema of tools. This directly mapped to a **shortcut schema that could accommodate any amount of future tools and functions with high ease of use**, and very short onboarding.

Hand position



High-frequency hotkeys



Low-frequency hotkeys

Schema in collapsable UI

Maintaining hand orientation was critical to allow the user to keep their focus on the map being annotated. Because of this priority, the amount of physical keys available for the schema was limited.

To compensate, **utilizing key sequences allowed for a greater number of functions to be usable via hotkey**.

For example, to enable a double-dash line paint marker tool, a user would press:

1. "2" to select the paint marker tool category.
2. "S" to select road separation paints.
3. "R" to select the double-dash attribute.

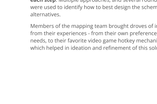
This **action can be done in a fraction of a second** by an onboarded user, as all of these keys are in close proximity to the user's hand orientation.

This key-mapping strategy allowed users to maintain a single mental model of how they selected tool category, selected tool type, and selected any attribution. **Regardless of how tool requirements changed in the future, this schema is flexible to that change.**

Prioritization and ordering of what tool required less key-strokes to enable, is based on the frequency of that tool's use. This is somewhat inspired by the concept of Huffman encoding.

Toolbox selection

Toolbox and attribute hotkeys



Schema adoption

Immediate feedback was enthusiastic and the feature was quickly adopted by the mapping teams. Onboarding of this feature set, given the consistent mental model for all tools, took about 5-10 minutes per user given a supplementary guide.

Fast onboarding of this feature set was important to ensure, as the company planned to significantly expand the mapping team with new operators.

Comprehensive approach

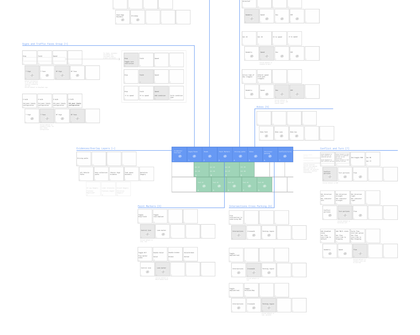
This schema not only encompassed tooling, but **every critical action a mapper uses** - from tool selection, to feature visualization, to evidence visualization, to even numerical input.

Given the specialization of the audience, and the consistency of the schema, it became second nature to the mappers in a short period. This is because **they now felt that they could rely on hotkeys, and the time investment to learn them would improve their ease of use.**

Interviews and testing

The schema was **designed in collaboration with users at each step.** Multiple approaches, and several rounds of testing, were used to identify how to best design the schema vs alternatives.

Members of the mapping team brought droves of inspiration from their experiences - from their own preferences, to their needs, to their favorite video game hotkey mechanics. All of which helped in ideation and refinement of this solution.



Thank you

Thank you for taking the time to review some of my work of the past few years.

I’d love to work with you to take on the challenges you’re facing. Not problem is so complicated it can’t be solved.

Luke Schenker